

slats limits opening percent to 50. Therefore, 3, 4, or more slats can be used. For instance, 5 slats will allow any opening of 20% to 80% of the closed area. The moving of the slats uses a small displacement, enabling the direct use of shape memory materials.

[0079] In yet another embodiment, as illustrated in FIG. 16, elements slidably engaged to each other (e.g., a sliding rod inside a conduit, tongue and groove connected elements, and so forth) can be used to deploy sunshades. For example, for each pair (i.e., conduit and its corresponding sliding rod), one end of the conduit **94** has a pin hole such that the conduit **94** can be constrained by a pin **92** but allowing sliding motion along a slot on a frame (e.g., a glazing area frame). Similarly, one end of the rod **96** also has a pin hole such that the rod **96** can be constrained by a pin **98** and can slide along a slot of the frame **100**. A SMA wire **102** can connect the open end of the conduit **94** and the open end of the rod **96** such that, when heated, the wire **102** will contract and force the rod **96** to move out of the conduit **94**. If multiple pairs of conduits and rods are cooperatively connected (e.g., as shown in FIG. 16) with the bottom row of pins fixed to the window frame, the top row of pins hooked to a shade, and the remaining rows of pins connect to corresponding conduits or rods, then the cover (e.g., sunshade) **104** can be deployed by heating all the SMA wires **102** to above their corresponding transformation temperatures. Spontaneous deployment will start once the temperature near the wires reaches its phase transformation temperature. By proper design, spontaneous stowing will start once the wire temperature reaches its martensite start temperature with bias force (e.g., from gravity, from a spring within the scroll that the sunshade is rolled off from or rolled up to). On-demand deployment or stowing can also be accomplished using electrical heating to the wires and some kind of latching or ball point pen toggling mechanism can be used to achieve power off hold. It is noted that the cross-section of the conduit or element described in any embodiment can be any proper geometry, e.g., rounded (such as a rod, tube, and so forth), polygonal (e.g., a bar, and so forth), as well as combinations comprising at least one of the foregoing.

[0080] FIG. 17 illustrates an embodiment that employs a Jack mechanism to deploy a cover **104**, e.g., sunshades. In this embodiment, many pairs of elements **106** (forming a pair of scissors within each pair) are interconnected to each other cooperatively via pins **108** through their corresponding pin holes on the elements **106**. The bottom of each pair is connected to the top of another via pins through their corresponding pin holes on the elements except the very top pair has their corresponding pins sliding in a slot **110** of a connector that is holding the cover **104** and the very bottom pair has their corresponding pins sliding in a slot **110** of the window frame **112**. A SMA wire **114** is connected between two anchor points of a pair of elements and the contraction due to raising temperature above its transformation temperature will deploy the sunshade. Both spontaneous or on-demand deployment can be achieved as with the embodiment shown in FIG. 16. In addition, the location of the wire is flexible, and multiple wires can be used at multiple locations.

[0081] Ranges disclosed herein are inclusive and combinable (e.g., ranges of “up to about 25 wt %”, or, more specifically, about 5 wt % to about 20 wt %”, is inclusive of the endpoints and all intermediate values of the ranges of “about 5 wt % to about 25 wt %,” etc.). “Combination” is inclusive of blends, mixtures, derivatives, alloys, reaction products, and the like. Furthermore, the terms “first,” “second,” and the like,

herein do not denote any order, quantity, or importance, but rather are used to distinguish one element from another, and the terms “a” and “an” herein do not denote a limitation of quantity, but rather denote the presence of at least one of the referenced item. The modifier “about” used in connection with a quantity is inclusive of the state value and has the meaning dictated by context, (e.g., includes the degree of error associated with measurement of the particular quantity). The suffix “(s)” as used herein is intended to include both the singular and the plural of the term that it modifies, thereby including one or more of that term (e.g., the colorant(s) includes one or more colorants). Reference throughout the specification to “one embodiment”, “another embodiment”, “an embodiment”, and so forth, means that a particular element (e.g., feature, structure, and/or characteristic) described in connection with the embodiment is included in at least one embodiment described herein, and may or may not be present in other embodiments. In addition, it is to be understood that the described elements can be combined in any suitable manner in the various embodiments.

[0082] All cited patents, patent applications, and other references are incorporated herein by reference in their entirety. However, if a term in the present application contradicts or conflicts with a term in the incorporated reference, the term from the present application takes precedence over the conflicting term from the incorporated reference.

[0083] While the disclosure has been described with reference to an exemplary embodiment, it will be understood by those skilled in the art that various changes can be made and equivalents can be substituted for elements thereof without departing from the scope of the disclosure. In addition, many modifications can be made to adapt a particular situation or material to the teachings of the disclosure without departing from the essential scope thereof. Therefore, it is intended that the disclosure not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this disclosure, but that the disclosure will include all embodiments falling within the scope of the appended claims.

What is claimed is:

1. A cover system, comprising:
 - a cover; and
 - an active material component in operable communication with the cover;
 wherein the active material component comprises an active material that enables the deployment and retraction of the cover.
2. The system of claim 1, wherein the active material enables the deployment and retraction of the cover remotely, passively, or actively.
3. The system of claim 2, wherein the active material is configured such that when the active material attains a certain temperature, it becomes flexible and the cover deploys.
4. The system of claim 3, wherein the cover can be returned to its original position by heating the active material, retracting the cover to a retracted position, and cooling the cover in the retracted position.
5. The system of claim 3, wherein the active material component comprises a sheet of shape memory polymer.
6. The system of claim 3, wherein the active material component comprises a shape memory alloy embedded in the cover.